CHANDRA SHEKHAR AZAD UNIVERSITY OF AGRICULTURE AND TECHNOLOGY, KANPUR- 208 002

B.Sc. (V Semester)

GPB-502 (Principles of Plant Breeding) 3 (2+1)

Topic: Pure Line Theory, Pure line and Pure Line Selection

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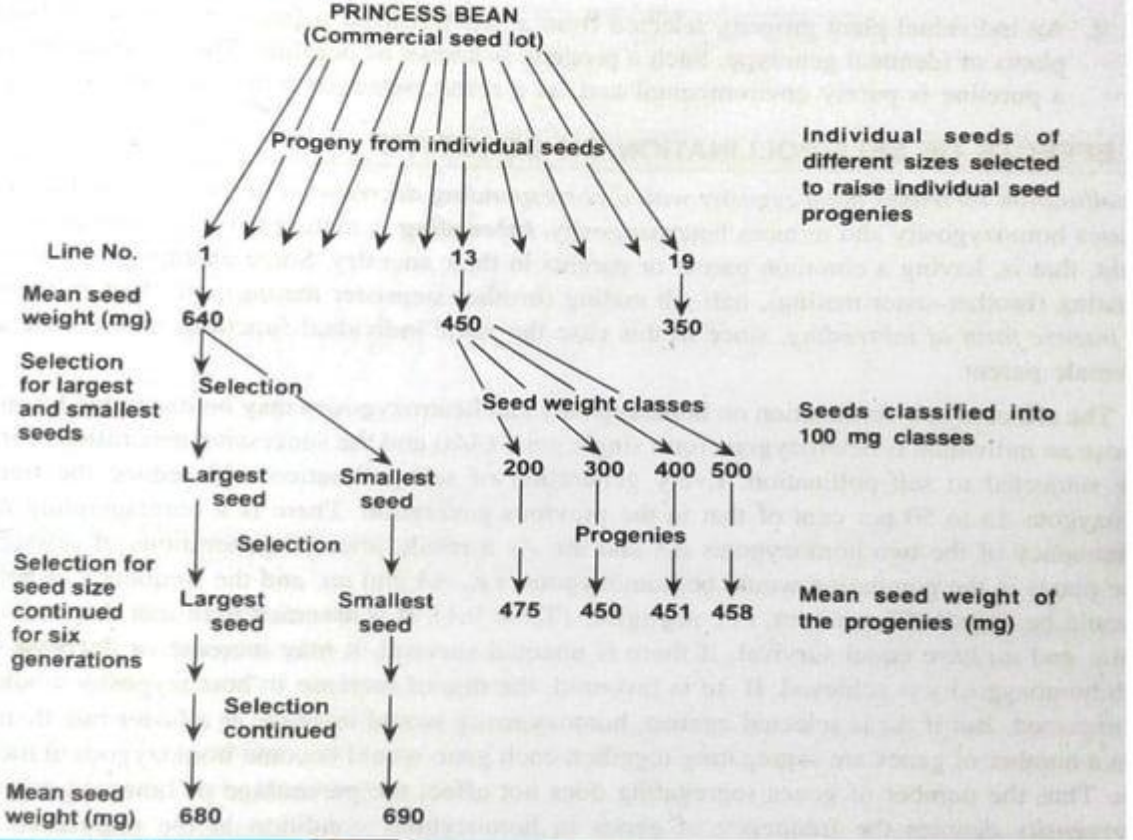
PURE LINE

WILHELM JOHANSSEN
(A DANISH BOTANIST)

DISCOVERED THE PURE LINE THEORY IN
French Bean (*Phaseolus vulgaris*) 1903

PURE LINE THEORY



JOHANNSEN Selected different seeds of **variety of French bean** and grow,

Selected seeds grow as individual plant progenies having different seed size,
LARGE SEEDS = FROM LARGER PROGENY
SMALL SEEDS = FROM SMALLER PROGENIES
(It is the commercial seed lot)
(Which show the variation in commercial seed lot)

Further **JOHANNSEN** grow **19th** line having the different seeds size,

Each and every line show characteristics mean seed weight,
from 640mg in line 1 to 350mg in line no. 19,

The seed size within a line sowed some variation which will be **smaller** than that present in the original commercial seed lot,

JOHANNSEN postulated that the original seed lot was a mixture of pure lines, thus each of the 19 lines represented a pure line.
Variation will be non heritable and due to environment.

JOHANNSEN classified each pure line seeds into **100mg** classes, and grow them separately. For example, shown in the diagram **line no. 13**, and the mean seed weight of It is given in just below the diagram,

From each pure line **JOHANNSEN** selected the largest and smallest seeds to rise in next generation and grow again and again till **six year**, and **selection for six year will be ineffective.**

FINALLY SELECTION WITHIN THE PURE LINE WAS INEFFECTIVE. AND GAVE THE PURE LINE THEORY

PURE LINE

A pure line is the progeny of a single homozygous plant of a self pollinated

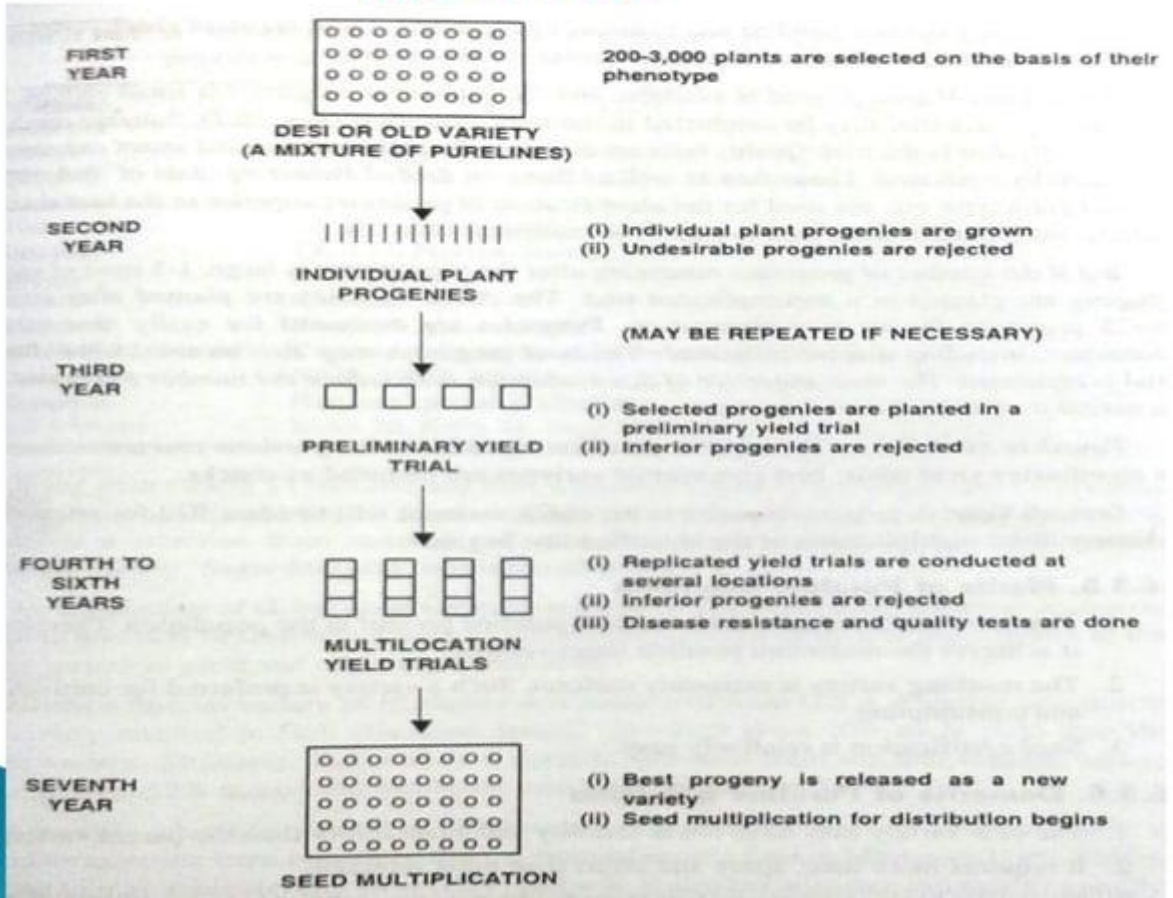
Characters of pure lines

- HOMOZYGOUS
- NON-HERITABLE VARIATION
- STABLE

PURE LINE SELECTION

1. Pure line selection is used in the self pollinated crops,
2. It is used to improve,
   a. Local varieties,
   b. Old pure line varieties,
   c. Introduced varieties.

PROCEDURE


FIRST YEAR
DESI OR OLD VARIETY (A MIXTURE OF PURELINES)
200-3,000 plants are selected on the basis of their phenotype
SECOND YEAR
INDIVIDUAL PLANT PROGENIES
(i) Individual plant progenies are grown
(ii) Undesirable progenies are rejected
(MAY BE REPEATED IF NECESSARY)
THIRD YEAR
PRELIMINARY YIELD TRIAL
(i) Selected progenies are planted in a preliminary yield trial
(ii) Inferior progenies are rejected
FOURTH TO SIXTH YEARS
MULTILOCATION YIELD TRIALS
(i) Replicated yield trials are conducted at several locations
(ii) Inferior progenies are rejected
(iii) Disease resistance and quality tests are done
SEVENTH YEAR
SEED MULTIPLICATION
(i) Best progeny is released as a new variety
(ii) Seed multiplication for distribution begins

USE OF PURE LINE

I. Superior line is used as a variety.

II. Used as parent in development of new variety by hybridization.

III. Used for study the mutation and other biological investigation.

ADVANTAGES

I. Have the same genotype.

II. Attractive and liked by the farmers and consumers.

III. Pure lines are stable and long test for many years.

IV. Due to its extreme uniformity easily identified in seed certification process.

Disadvantages

I. New genotypes are not created by pure line selection,
II. Improvement is limited to the isolation of the best genotype present in population,
III. Selection of pure lines requires great skill and familiarity with the crop.
IV. It is difficult to detect small differences that exist between cultures,
V. The breeder has to give more times,
VI. Pure lines have limited adaptability therefore it can be recommended for cultivation in limited area only,
VII. No more improvement is possible after isolation of the best available genotype in the population,

Achievements

Plants	Varieties			
Wheat	Np-4	Np-6	Np-12	Np-28
Green Gram	B-1	T-1		
Rice	Mtu-1	Mtu-3	Mtu-7	Bcp-1
Sorghum	G 1 & 2	M 1 & 2, Oo1	M 4 & 5	

THANK YOU